



CALIFORNIA ENERGY COMMISSION

Life Cycle Cost and Time Dependent Value History

Joe Loyer
Building Standards Office
Efficiency Division

2016 Update of the Life Cycle Cost Methodology
and Time Dependent Valuation
California Energy Commission
April 29, 2014



The Life Cycle Cost Analysis and the Time Dependent Value

- Why the Energy Commission uses LCC
- LCC before the TDV
- Adding in the TDV
- How TDV is Developed
- Basic Changes from 2005 through 2013



Why the Energy Commission Uses Life Cycle Cost Analysis

The Warren-Alquist Act

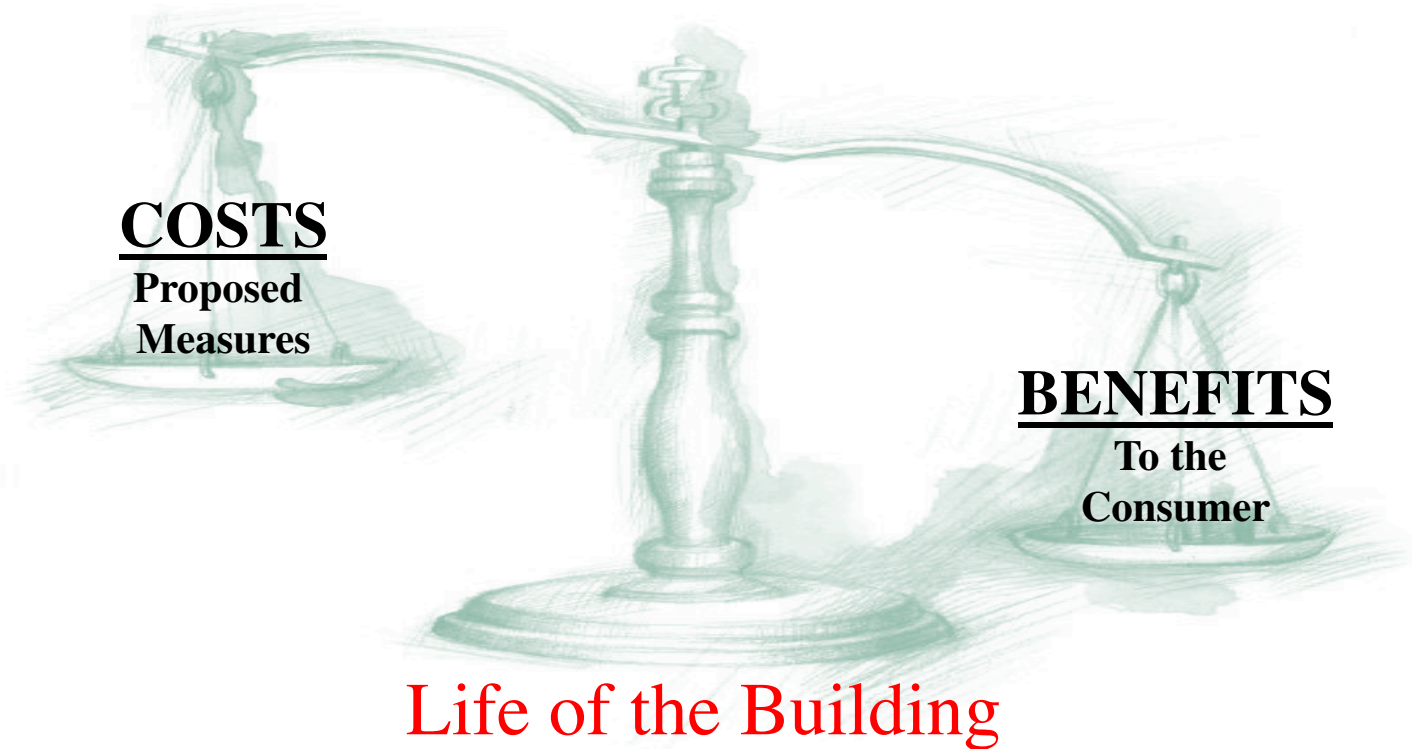
Public Resources Code § 25402(b)(3)

“The standards adopted or revised pursuant to subdivisions shall be **cost-effective** when taken in their entirety and when amortized over the economic life of the structure compared with historic practice. When determining cost-effectiveness, the commission shall consider the value of the water or energy saved, impact on product efficacy for the consumer, and the **life cycle cost** of complying with the standard.”



What is a Life Cycle Cost Analysis

A Simple Concept





Life Cycle Cost **before** Time Dependent Value

The Annual LCC Method

Change in LCC =

Change in Initial Cost of Construction -
Present Value of Electricity Cost Savings -
Present Value of Gas Cost Savings

$\Delta LCC = \Delta \text{Construction} - PV(\text{Electricity}) - PV(\text{Gas})$

Discount Rate: 3% Life Cycle: 15 and 30 years



Life Cycle Cost **before** Time Dependent Value

Benefits: Simple Multipliers for Savings

- 6 Multipliers - 3 for Electricity \$/kwh and 3 for Natural Gas \$/Therms
- Sufficient to show the measures under consideration are cost effective



Adding in the Time Dependent Value

Benefits:

- Accounts for Seasonal and Time of Use.
- Based on a time series of hourly present values for electricity, natural gas and propane.
- Values for residential and nonresidential for all 16 climate zones.



How the Time Dependent Value Series are Developed

Electricity TDV Series

- Natural Gas Price Forecast
- Transmission & Distribution Costs
- Emissions Costs
- Ancillary Services and Peak Capacity Costs
- Revenue neutrality adjustment (Fixed Costs)

Natural Gas TDV Series

- Natural Gas Retail Rate Forecast

Propane TDV Series

- Department of Energy Propane Retail Price Forecast



Basic Changes Since the 2005 Time Dependent Value

2008 Update

- 1999 Power Exchange day ahead market prices.
- Consideration of avoided customer outages.
- Consideration of adverse impacts on customers when Demand Response is operated.

2013 Update

- Correlating Weather with Load
- Long-Term Market Price Shapes (Renewables)
- Higher Retail Rate Forecast
- Statewide Retail Rate Adjustment